

# Inspection Plan With Recommendations



Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 221 - Process Piping Location

**Report Date: 10/2/2012****RICHMOND REFINERY****Data Source: Meridium**

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 221 - Process Piping Location

Equip ID: 0955-003-001

Asset Type: 221

State Reported:

Strategy Nbr: 83 Name: Corrosion at Injection Point

Equipment Location Status: ACTIVE

Inspection Interval in Years: 0

Available During Run:

Int. Entry Poss?: No

Year Built:

Description: C-1100 OVHD

**CM Description:****Current Corrosion Rate****Remaining Life****Retirement Date**

UT Monitoring

56.161

4.986

1/26/2017

Task: Addl Surv Actv 1

Next Insp DT: 8/17/2011

Last Insp DT: 8/17/2009

Basis:

Extent:

Inspection Comments:

Replace corrosion probes. Annual replacement of the corrosion probes is required to ensure this work can be done on the run. Probes will completely corrode away making them dangerous to extract on the run.

**Recommendation Number:**

REC-57096

**Equipment ID:**

0955-003-001

**Asset Type:**

221

**Rec Type:**

SHUTDOWN

**Rec Status:**

Approved

**Created:**

11/6/2006 1:49:39 PM

**Completion:****Author:**

JMIG

**Headline:**

Replace H2O injection section and exchanger inlet header piping

**Notes:**

Recommendations:

Replace the following sections of C-1100's overhead piping due to internal corrosion (HCl): 1) a 15' section at the water injection point near the top of the column; 2) the entire cooler inlet header from the 36" ell to the 12" E-1101 inlet ells Use Hastelloy C-276 lined/overlaid piping material. (Note: This work already has an EWO: BE118-E1).

**Recommendation Number:**

REC-79820

**Equipment ID:**

0955-003-001

**Asset Type:**

221

**Rec Type:****Rec Status:**

Approved

**Created:**

4/6/2009 1:02:20 PM

**Completion:****Author:**

TBEA

**Headline:**

OVHD line AUT inspection recommendation

**Notes:**

Recommendations:

History: in 2007 the crude unit ovhd line was replaced with some hastelloy weld overlayed sections. 15 ft downstream of Y on the 36" section of line and from the 36"-24" transition at the elbow to the inlet of the E-1101s. We are currently relying on corrosion probes to assist in determining any corrosion in the ovhd system. We recently discovered that these probes are not working at this time. AUT inspection will serve as a corrosion monitoring device as well as base line information for the new corrosion probes. Recommendation 1. AUT areas selected by area inspector to monitor corrosion activity. 2. Research using Rope Access crew to install AUT machine and avoid staging. 3. Mark Siewald with Chevron Energy and Technology center should be used for AUT inspection. John 5187.

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 221 - Process Piping Location

Equip ID: 0955-003-002

Asset Type: 221

State Reported:

Strategy No:

Name: Corrosion at Injection Point

Equipment Location Status: ACTIVE

Inspection Interval In Years: 0

Available During Run:

Int. Entry Poss? No

Year Built:

Description: C-1100/DV1D

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

4.029

57.086

11/24/2064

Task: Addl Surv Actv 1

Next Insp DT: 8/17/2011

Last Insp DT: 8/17/2009

Basis:

Extent:

Inspection Comments:

Replace corrosion probes. Annual replacement of the corrosion probes is required to ensure this work can be done on the run. Probes will completely corrode away making them dangerous to extract on the run.

Recommendation Number:

REC-79821

Equipment ID:

0955-003-002

Asset Type:

221

Rec Type:

Rec Status:

Approved

Created:

4/6/2009 1:14:40 PM

Completion:

Author:

TBEA

Headline:

AUT of E-1101s outlet piping

Notes:

Recommendations:

History: in 2007 the crude unit ovhd line was replaced with some hastelloy weld overlayed sections. 15 ft downstream of Y on the 36" section of line and from the 36"-24" transition at the elbow to the inlet of the E-1101s. the outlet lines have not had a history of corrosion, though we would like to review the outlet lines based on the history of corrosion in the E-1100 exchangers. We are currently relying on corrosion probes to assist in determining any corrosion in the ovhd system. We recently discovered that these probes are not working at this time. AUT inspection will serve as a corrosion monitoring device as well as base line information for the new corrosion probes. Recommendation 1. AUT areas selected by area inspector to monitor corrosion activity. 2. Research using Rope Access crew to install AUT machine and avoid staging. 3. Mark Siewald with Chevron Energy and Technology center should be used for AUT inspection. John 5187.

Recommendation Number:

REC-82000

Equipment ID:

0955-003-002

Asset Type:

221

Rec Type:

Rec Status:

Approved

Created:

8/11/2009 10:23:18 PM

Completion:

Author:

TBEA

Headline:

e-1101A/D corrosion probe inspection

Notes:

Recommendations:

INFORMATION Overhead corrosion probes in the crude unit were on the schedule to be changed out during the 2009 pit stop. There are corrosion probes on the inlet side of E-1101A and E-1101D these 2 probes were replaced during the outage. There are corrosion probes on the outlet of E-1101A and E-1101D and these 2 were not replaced during the outage. The inlet probes were safety concerns due the amount of corroded material and the potential for a release through the corrosion probe itself. The 2 outlet probes need to be reviewed with radiography to determine if there is any potential risk of release through this orifice. Drawing 0955-003-002. See attached drawing REC-82000  
RECOMMENDATIONS 1. Stage as required for access. 2. Perform RT inspection on the outlet probes in E-1101A and D. 3. Review data to determine if additional measures are required to ensure safe operation until the next outage. 4. Set up a review schedule to monitor on the run. Contact John Beauregard 2-5187 with questions or concerns. \*\*Material, Fabrication, Welding, Inspection and Testing shall be performed in accordance with the Richmond Refinery - Metals Craft, Quality Assurance Procedures.

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 221 - Process Piping Location

Equip ID: 0955-006-004 Asset Type: 221 State Reported: Strategy Nbr: 46 Name: Corrosion Under Insulation (CUI)  
Equipment Location Status: ACTIVE Inspection Interval In Years: 4 Name: High Temp H2/H2S Corrosion  
Available During Run: Unit Entry Poss: No Year BUILT  
Description: C-1130 NO. 3 SIDECUT OUTLET

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

5

Task: RT Monitoring

Next Insp DT: 10/20/2012

Last Insp DT: 9/7/2010

Basis:

Extent:

Inspection Comments:

Report Date: 10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 221 - Process Piping Location

Equip ID: 0955-006-006

Asset Type: 221

State Reported:

Strategy Nbr: 46 Name: Corrosion Under Insulation (CUI)

Equipment Location Status: ACTIVE

Inspection Interval In Years:

Available During Run:

Int. Entry Poss? No

Year Built:

Description: C-1130 NO. 3 SIDECUT OUTLET

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

5

30.4

3/2/2033

Task: UT Monitoring

Next Insp DT: 10/7/2012

Last Insp DT:

Basis:

Extent:

Inspection Comments:

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 221 - Process Piping Location

Equip ID: 0955-008-001

Asset Type: 221

State Reported:

Strategy Nbr: 46 Name: Corrosion Under Insulation (CUI)

Equipment Location Status: ACTIVE

Inspection Interval In Years:

Available During Run:

Int. Entry Poss? No

Year Built:

Description: C-1100 OUTLET- NO. 5 SIDECUT

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

11.432

15.723

7/26/2027

Task: RT Monitoring

Next Insp DT: 12/27/2012

Last Insp DT: 12/28/2002

Basis:

Extent:

Inspection Comments:

Recommendation Number:

REC-37606

Equipment ID:

0955-008-001

Asset Type:

221

Rec Type:

Rec Status:

Approved

Created:

1/11/2005 3:30:03 PM

Completion:

Author:

JMIG

Headline:

5 Year VT/CUI Inspection Results

Notes:

Recommendations:

Reinsulate for personnel protection at C-1100 & P-1158/A, P-1159/A suction.

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 221 - Process Piping Location

Equip ID: 0955-010-016

Asset Type: 221

State Reported:

Strategy Nbr

Equipment Location Status: ACTIVE

Inspection Interval In Years:

Available During Run

Int Entry/Ross? No

Year Built:

Description: V-160 QUT - VENT GAS TO K-H/1 (Q/STG)

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

5

Task: RT Monitoring

Next Insp DT: 12/19/2012

Last Insp DT: 12/19/2007

Basis:

Extent:

Inspection Comments:

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 221 - Process Piping Location

Equip ID: 0955-038-001

Asset Type: 221

State Reported:

Strategy Nb:

Equipment Location Status: ACTIVE

Inspection Interval in Years: 0

Available During Run:

Int. Entry Poss:

Year Built:

Description: STRIPPED WATER FLUSH HEADER

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

Task: RT Monitoring

Next Insp DT: 1/23/2012

Last Insp DT: 1/23/2012

Basis:

Extent:

Inspection Comments:

Recommendation Number:

REC-65096

Equipment ID:

0955-038-001

Asset Type:

221

Rec Type:

INSPECTION

Rec Status:

Approved

Created:

9/24/2007 6:57:19  
AM

Completion:

Author:

JMJG

Headline:

Repair/replace severely internally corroded section of stripped H2O flush header

Notes:

Recommendations:

Severe internal corrosion was detected during the 2007 OSI program on TML # 3 (vertical dead leg with pipe cap) to 0.08". Further RT is being conducted to determine if corrosion is more widespread; recent RT of the other established TML's on this line did not reveal any other corrosion as severe. RECOMMENDATION: Replace the internally corroded section of line per pipe class "AB0"; NDE and hydrotest per pipe class (weld inspection to follow both). Contact Joe George @ 2-3389 for more information. .



Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 221 - Process Piping Location

EquipID: 0955-040-000

Asset Type: 221

State Reported:

Strategy Nb:

Equipment Location Status: ACTIVE

Inspection Interval In Years: 0

Available During Run:

Int Entry Poss: No

Year Built:

Description: MEDIUM PRESSURE STEAM

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

Task: RT Monitoring

Next Insp DT: 1/5/2012

Last Insp DT: 1/5/2012

Basis:

Extent:

Inspection Comments:

# Inspection Plan With Recommendations



Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 252 - Drums / Vessel Location

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 252 - Drums / Vessel Location

Equip ID: V-1103

Asset Type: 252

State Reported:

Strategy Nbr:

13 Name: Sour Water Corrosion (acidic)

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

9 Name: HCl Corrosion

Available During Run: No

Int Entry Pos: 7 Yes

Year Built:

46 Name: Corrosion Under Insulation (CUI)

Description: FLASH SURGE DRUM

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

3.077

160.5

5/6/2172

Task: Visual CUI Monitoring

Next Insp DT: 10/3/2011

Last Insp DT: 10/3/2006

Basis: API-510, IS-46

Extent: 25% of potential areas

Inspection Comments:

Vessel operates at upper end of CUI temperatures. -jmg 12/23/08

Recommendation Number:

REC-17410

Equipment ID:

V-1103

Asset Type:

252

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

11/1/1996

Completion:

Author:

JMJC

Headline:

S/D Recommendation

Notes:

Recommendations:

Open &amp; clean for internal inspection. Inspect vortex breaker hold-down bolting and attachment. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

Recommendation Number:

REC-97099

Equipment ID:

V-1103

Asset Type:

252

Rec Type:

Rec Status:

Approved

Created:

2/22/2012 7:53:10 AM

Completion:

Author:

TBEA

Headline:

damaged bellows C7-16

Notes:

Recommendations:

information following the damaged bellows the following options have been explored for repair. 1. Shut down the crude unit and replace the damaged PSV 2. Hot tap in a new PSV 3. Utilize system controls and a written procedure to comply with the ASME code to provide adequate protection for the vessel. 4. Work closely with the FER group to ensure all compliance items are met. Please feel free to contact me with questions or concerns. maximo 351709 .

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 252 - Drums / Vessel Location

Equip ID: V-1107	Asset Type: 252	State Reported:	State Nbr:
Equipment Location Status: INACTIVE	Inspection Interval In Years:		
Available During Run: Yes	Unit Entry Poss: Yes	Year Built:	
Description: OVHD CORROSION INHIBITOR DRUM (CCS)			

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

1.486

124.495

7/31/2126

Task: UT Monitoring

Next Insp DT: 1/31/2007

Last Insp DT: 1/31/2002

Basis:

Extent:

Inspection Comments:

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 252 - Drums / Vessel Location

Equipment ID: V-1107A

Asset Type: 252

State Reported:

Category Nbr: 46

Name: Corrosion Under Insulation (CUI)

Equipment Location Status: INACTIVE

Inspection Interval In Years: 10

Available During Run: Yes

Int. Entry Poss? No

Year Built:

Description: CORROSION INHIBITOR DREM (OOS)

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

5

Task: Internal Visual Monitoring

Next Insp DT: 8/1/2010

Last Insp DT: 8/1/2000

Basis: API 510

Extent:

Inspection Comments:

Recommendation Number:

REC-17413

Equipment ID:

V-1107A

Asset Type:

252

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

8/13/2003

Completion:

Author:

JM/G

Headline:

S/D Recommendation

Notes:

Recommendations:

This equipment is currently out of service. Open & clean for internal inspection, or externally UT gage and inspect in lieu of internal. Remove all insulation for CUI inspection, repair, recoat, and reinsulate as needed following inspection. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

# Inspection Plan With Recommendations



Report Date: 10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 255 - Filter Location

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 255 - Filter Location

Equip ID: K-1149 Asset Type: 255 State Reported: Strategy No: 47 Name: Atmospheric Corrosion  
Equipment Location Status: ACTIVE Inspection Interval In Years: 5  
Available During Run: Yes Initial Entry Poss: No Year Built:  
Description: 4 SC FLUSH OIL FILTER

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

3.109

33.13

6/22/2042

Task: External Visual Monitoring Next Insp DT: 9/20/2012

Last Insp DT: 9/20/2007

Basis: State requirement; IS-47 Extent:

Inspection Comments: Not a code vessel (too small and not enough pressure) but still meets the State criteria for a pressure vessel (over 6" in diameter). Recommend continuing to externally inspect on a API-510 5-year frequency unless conditions change. -jmg 1-28-09

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 255 - Filter Location

Equip ID: K-1149A

Asset Type: 255

State Reported:

Strategy Nbr: 47 Name: Atmospheric Corrosion

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

Available During Run: Yes

Ins Entry Poss: No

Year Built:

Description: 4 SC FLEX OIL FILTER

**CM Description:**

**Current Corrosion Rate**

**Remaining Life**

**Retirement Date**

UT Monitoring

3.109

36.346

9/9/2045

Task: External Visual Monitoring Next Insp DT: 9/20/2012

Last Insp DT: 9/20/2007

Basis: State requirement, IS-47 Extent:

Inspection Comments: Not a code vessel (too small and not enough pressure) but still meets the State criteria for a pressure vessel (over 6" in diameter). Recommend continuing to externally inspect on a API-510 5-year frequency unless conditions change. -jmg 1-28-09



Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 255 - Filter Location

Equip ID: K-1179

Asset Type: 255

State Reported:

Strategy Nbr:

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

Available During Run: Yes

Int. Entry Poss? No

Year Built:

Description: 7 SC FLUSH OIL FILTER

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

2

117.5

2/15/2124

Task: External Visual Monitoring Next Insp DT: 9/20/2012

Last Insp DT: 9/20/2007

Basis: State requirement, API-510 Extent:

Inspection Comments: Vessel is too small (only 1 cu ft) to meet the criteria for an API-510 pressure vessel but does meet the State requirements (greater than 6" in diameter). Recommend using API-510 inspection requirements for pressure vessels (5 years for external and 10 years for internal inspections); small size allows for conducting external in lieu of internal inspections although the vessel ID can be viewed from the outside during maintenance. -jmg 1/29/09

Report Date: 10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 255 - Filter Location

Equip ID: K-1190

Asset Type: 255

State Reported:

Strategy Nbr:

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

Available During Run: Yes

Int. Entry Poss? No

Year Built:

Description: E-1190S MIST FOGGING H2O FILTER

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

0

Task: External Visual Monitoring

Next Insp DT: 9/20/2012

Last Insp DT: 9/20/2007

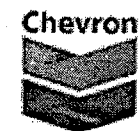
Basis: (see below)

Extent:

Inspection Comments:

Vessel is too small (only 1 cu ft) to meet the criteria for an API-510 pressure vessel but does meet the State requirements (greater than 6" in diameter). Recommend using API-510 inspection requirements for pressure vessels (5 years for external and 10 years for internal inspections); small size allows for conducting external in lieu of internal inspections although the vessel ID can be viewed from the outside during maintenance. -jmg 1/29/09

# Inspection Plan With Recommendations



Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 271 - Floating Roof Tank Location

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 271 - Floating Roof Tank Location

Equip ID: T-3144

Asset Type: 271

State Reported:

Strategy Nbr

Equipment Location Status: INACTIVE

Inspection Interval In Years: 10

Available During Run

Int Entry Poss?

Year Built

Description: OTHER TANK (OUT OF SERVICE)

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

5

Task: UT Monitoring

Next Insp DT: 6/1/2006

Last Insp DT: 6/1/1996

Basis:

Extent:

Inspection Comments:

Task: Internal Visual Monitoring

Next Insp DT: 6/6/2009

Last Insp DT: 6/6/1989

Basis:

Extent:

Inspection Comments:

Task: External Visual Monitoring

Next Insp DT: 1/1/2000

Last Insp DT: 1/1/1995

Basis:

Extent:

Inspection Comments:

Recommendation Number:

REC-17407

Equipment ID:

T-3144

Asset Type:

271

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

11/1/1996

Completion:

Author:

JMJG

Headline:

S/D Recommendation

Notes:

Recommendations:

# Inspection Plan With Recommendations



Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Report Date: 10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1102A (955)

Asset Type: 281

Status: Reported

Status Nbr:

3 Name: Sour Water Corrosion (acidic)

4 Name: Corrosion Under Insulation (CUI)

Equipment Location Status: ACTIVE

Inspection Interval In Years:

Available During Run: No

Inspection Date: 12/23/08

Year Built:

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

2.322

145.995

2/14/2153

Task: Visual CUI Monitoring

Next Insp DT: 2/16/2012

Last Insp DT: 2/16/2007

Basis: API-510, IS-46

Extent: 50% of susceptible areas

Inspection Comments:

Pay particular attention to the bottom area of the shell and near the shell/channel flanges and nozzles; E-1106 suffered severe CUI at the bottom of the shell near the midpoint of the exchanger. Date shown is last external inspection. -jmg 12/23/08

Recommendation Number:

REC-16604

Equipment ID:

E-1102A (955)

Asset Type:

281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

6/12/2003

Completion:

Author:

JMJG

Headline:

S/D Recommendation

Notes:

Recommendations:

Open & inspect ET 10% of tubes. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

**Report Date: 10/2/2012****RICHMOND REFINERY****Data Source: Meridium****Division: 2DD - DR DISTILLATION****Unit: 0955 - 4 CRUDE UNIT PLT 11****Asset Type: 281 - Shell and Tube Exchanger Location****Equip ID: E-1102B**

Asset Type: 281

State Reported

Strategy Nbr

13 Name: Sour Water Corrosion (acidic)

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

6 Name: Naphthenic Acid Corrosion

Available During Run: No

Unit Entry Poss? Yes

Year Built

46 Name: Corrosion Under Insulation (CUI)

Description: CRUDE/ VAC TOP CIRC REFLUX (6 SC)

**CM Description:****Current Corrosion Rate****Remaining Life****Retirement Date**

UT Monitoring

10.68

14.232

5/13/2021

Task: Visual CUI Monitoring

Next Insp DT: 2/17/2012

Last Insp DT: 2/17/2007

Basis: API-510, IS-46

Extent: 50% of suspected areas

Inspection Comments:

Pay particular attention to the bottom area of the shell and near the shell/channel flanges and nozzles; E-1106 suffered severe CUI at the bottom of the shell near the midpoint of the exchanger. Date shown is last external inspection. -jmg 12/23/08

**Recommendation Number:**

REC-16605

**Equipment ID:**

E-1102B

**Asset Type:**

281

**Rec Type:**

SHUTDOWN

**Rec Status:**

Approved

**Created:**

6/12/2003

**Completion:****Author:**

JMIG

**Headline:**

S/D Recommendation

**Notes:**

Recommendations:

Remove channel cover and inspect tube ends. ET inspect tubes if "A" or "C" units have corrosion. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997.

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1102C

Asset Type: 281

State Reported:

Safety Nbr:

13 Name: Sour Water Corrosion (acidic)

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

46 Name: Corrosion Under Insulation (CUI)

Available During Run: No

Int Entry Poss: Yes

Year Built:

20 Name: Erosion / Erosion Corrosion

Description: CRUDE VAC FOR CRUC REFLUX (4 SC)

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

3.552

29.561

8/18/2036

Task: Visual CUI Monitoring

Next Insp DT: 2/16/2012

Last Insp DT: 2/16/2007

Basis: API-510, IS-46

Extent: 50% of suspected areas

Inspection Comments:

Pay particular attention to the bottom area of the shell and near the shell/channel flanges and nozzles; E-1106 suffered severe CUI at the bottom of the shell near the midpoint of the exchanger. Date shown is last external inspection. -jmg 12/23/08

Recommendation Number:

REC-16606

Equipment ID:

E-1102C

Asset Type:

281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

6/12/2003

Completion:

Author:

JMJC

Headline:

S/D Recommendation

Notes:

Recommendations:

Pull channel cover and ET 20% of tubes per '98 ET of old bundle. Inspect tube ends for corrosion. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .



Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1107A

Asset Type: 281

State Reported:

Strategy Nbr:

46 Name: Corrosion Under Insulation (CUI)

Equipment Location Status: ACTIVE

Inspection Interval In Years: 4

89 Name: Under Deposit Corrosion

Available During Run: No

Int. Entry Poss? Yes

Year Built:

8 Name: Ammonium Chloride Corrosion

Description: CRUDE / ATM TOP CIRC REFLUX

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

4.193

66.038

11/18/2077

Task: Eddy Current IRIS

Next Insp DT: 10/15/2012

Last Insp DT: 10/15/2008

Basis: API-510, IS-9 &amp; -89

Extent: 100% of bundle, particularly at the top and mid sections

Inspection Comments: Unit experienced a tube leak a year after a 10% inspection during the 2/07 S/D. Recommend process or materials changes to prevent corrosion; keep increased frequency until conditions change. -jmg 12/23/08

Task: Visual CUI Monitoring

Next Insp DT: 2/16/2012

Last Insp DT: 2/16/2007

Basis: API-510, IS-46

Extent: 50% of suspect areas

Inspection Comments: Pay particular attention to nozzles, saddles, and the shell/channel bottom; E-1106 suffered severe CUI on the bottom of the shell near the midpoint. -jmg 12/23/08

Recommendation Number:

REC-16612

Equipment ID:

E-1107A

Asset Type:

281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

6/18/2003

Completion:

Author:

JMJC

Headline:

S/D Recommendation

Notes:

Recommendations:

Pull channel cover, inspect tube ends, ET 10% of tubes. XUT, cut cookie holes for follow-up. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equipment ID: E-1107B

Asset Type: 281

State Reported:

Strategy Nbr:

9 Name: HCl Corrosion

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

46 Name: Corrosion Under Insulation (CUI)

Available During Run: No

Int. Entry Poss: Yes

Year Built:

89 Name: Under Deposit Corrosion

Description: CRUDE ATMOSPHERIC REFLUX

## CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

4.193

25.757

8/7/2037

Task: Visual CUI Monitoring

Next Insp DT: 2/16/2012

Last Insp DT: 2/16/2007

Basis: API-510, IS-46

Extent: 50% of suspected areas

Inspection Comments: Pay particular attention to nozzles, saddles, and the shell/channel bottom; E-1106 suffered severe CUI on the bottom of the shell near the midpoint. -jmg 12/23/08

Task: Eddy Current IRIS

Next Insp DT: 10/15/2012

Last Insp DT: 10/15/2008

Basis: API-510, IS-9 &amp; -89

Extent: 100%

Inspection Comments: Unit experienced a tube leak a year after a 10% inspection during the 2/07 S/D. Recommend process or materials changes to prevent corrosion; keep increased frequency until conditions change. -jmg 12/23/08

## Recommendation Number:

REC-16613

Equipment ID:

E-1107B

Asset Type:

281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

6/18/2003

Completion:

Author:

JM/JG

Headline:

S/D Recommendation

Notes:

Recommendations:

Open &amp; inspect based on results of "A" bundle inspection. XUT, cut cookie holes for follow-up. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

## Recommendation Number:

REC-64156

Equipment ID:

E-1107B

Asset Type:

281

Rec Type:

ROUTINE

Rec Status:

Approved

Created:

8/14/2007  
10:53:06 AM

Completion:

Author:

JM/JG

Headline:

Repair damaged fireproofing and seal insulation

Notes:

Recommendations:

The fireproofing on both pedestals was found spalled/cracked and needs to be repaired. The insulation needs to be sealed on both the channel and the shell.  
RECOMMENDATIONS: 1) Repair the damaged/cracked fireproofing on both pedestals. 2) Seal the insulation on both the channel and shell at penetrations. Contact Joe George at 2-3389 for more details. .

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1109

Asset Type: 281

State Reported:

Strategy Nbr:

BO Name: Polysulfide/Water Corrosion

Equipment Location Status: ACTIVE

Inspection Interval In Years: 3

A Name: Sulfidation

Available During Run: No

Int Entry Poss: Yes

Year Built:

Description: (CRUDE) NO S/D (CLP)

## CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

2

65

2/16/2072

Task: Addl Surv Actv 1

Next Insp DT: 9/17/2012

Last Insp DT: 9/17/2007

Basis: Tube ID/End Corrosion

Extent: 100% 1st pass; 10% rest of bundle

Inspection Comments: Severe ID corrosion within 16" of tubesheet plus end impingement noted during 1/07 S/D; bundle life 12 years (previous was 15 years). Inspect during the next shutdown to verify corrosion rate. -jmg 9-17-07

Task: Eddy Current IRIS

Next Insp DT: 3/31/2012

Last Insp DT: 3/31/2007

Basis: API-510, IS-1

Extent: 100% 1st pass, 25% balance

Inspection Comments: 1 Q07 S/D ET: severe ID corr 1st pass (retubed 1st pass); rest OK. Current corrosion rates are 4.6 mpy ID/1.6 mpy OD. Adjust frequency as needed based upon inspection results & back up with IRIS as needed. -jmg 2/12/09

## Recommendation Number:

REC-17336

Equipment ID:

E-1109

Asset Type: 281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

6/19/2003

Completion:

Author:

JM/JG

Headline:

S/D Recommendation

Notes:

Recommendations:

Open &amp; inspect. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1110B (955)

Asset Type: 281

State Reported:

Strategy No:

Name: Sulfidation

Equipment Location Status: ACTIVE

Inspection Interval in Years: 5

Available During Run: Yes

Int. Entry Poss: Yes

Year Bifit:

Description (CRUDE): RESIDUE

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

14.839

6.488

5/1/2018

Task: Eddy Current IRIS

Next Insp DT: 3/31/2012

Last Insp DT: 3/31/2007

Basis: API-510 IS-1

Extent: 50% of tubes

Inspection Comments:

Present corrosion rate of 11.4 mpy indicates bundle will be at 1/2-wall during the 2012 S/D; have contingency in place for repair/replacement. -jmg 2/12/09 High corrosion rates (> 5 mpy) noted during IQ07 S/D; bundle replaced. Increase inspection frequency; recommend replacing bundle with material upgrade for sulfidation corrosion mechanism. -jmg 4-9-08

Recommendation Number:

REC-17338

Equipment ID:

E-1110B (955)

Asset Type:

281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

6/19/2003

Completion:

Author:

JMJC

Headline:

S/D Recommendation

Notes:

Recommendations:

Open & inspect. Replace shell cover. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-110D-RET	Asset Type: 281	State Reported:	Strategy Nbr:
Equipment Location Status: RETIRED	Inspection Interval In Years:		
Available During Run: No	Int Entry/Poss: Yes	Year Built:	
Description: RESIDUUM CRUDE			

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

5

Task:	RBMI_Eddy Current IR	Next Insp DT: 8/8/2010	Last Insp DT: 8/8/2005
Basis:	Recognized practice WITHOUT Criticality rating.	Extent: 40% of Tubes (Min. with Eddy Current -50 tubes; Min. with IRIS - 10 tubes) (R-214)	

Inspection Comments:

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1112 (955)

Asset Type: 281

State Reported

Strategy Nbr: 80 Name: Polysulfide/Water Corrosion

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

Name: Sulfidation

Available During Run: No

Int. Entry Poss: Yes

Year Built

Description: CRUDE / NO. 3 SIDE CUT

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

10.587

20.071

11/30/2031

Task: Eddy Current IRIS

Next Insp DT: 3/31/2012

Last Insp DT: 3/31/2007

Basis: API-510, IS-1

Extent: 25% of tubes

Inspection Comments: Increased inspection frequency based on 2/07 ET results; prove out ET findings with IRIS as needed. - jmg 2/17/09

Recommendation Number:

REC-17340

Equipment ID:

E-1112 (955)

Asset Type:

281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

6/19/2003

Completion:

Author:

JMJG

Headline:

S/D Recommendation

Notes:

Recommendations:

**Report Date:10/2/2012****RICHMOND REFINERY****Data Source: Meridium****Division: 2DD - DR DISTILLATION****Unit: 0955 - 4 CRUDE UNIT PLT 11****Asset Type: 281 - Shell and Tube Exchanger Location****Equip ID: E-1114 (955)**

Asset Type: 281

State Reported:

Strategy Nbr:

80 Name: Polysulfide/ Water Corrosion

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

1 Name: Sulfidation

Available During Run: No

Int. Entry Poss? Yes

Year Built:

Description: CRUDE/NO. 8 SIDECUT EXCHANGER

**CM Description:****Current Corrosion Rate****Remaining Life****Retirement Date**

UT Monitoring

1.983

98.84

12/18/2105

Task: Eddy Current IRIS

Next Insp DT: 3/31/2012

Last Insp DT: 3/31/2007

Basis: API-510, IS-1

Extent: (see notes)

Inspection Comments:

Pull channel cover and ET 50% 1st pass &amp; ~ 10% of rest of bundle to verify rates. Consider replacing bundle with materials upgrade due to ID corrosion and end impingement from sulfidation. -jmg 2/17/09

**Recommendation Number:**

REC-17342

**Equipment ID:**

E-1114 (955)

**Asset Type:**

281

**Rec Type:**

SHUTDOWN

**Rec Status:**

Approved

**Created:**

6/23/2003

**Completion:****Author:**

JMIG

**Headline:**

S/D Recommendation

**Notes:**

Recommendations:

Open &amp; inspect. Install 304L SS ferrules to prevent end impingement. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1117

Asset Type: 281

State Reported:

State: Nbr:

Equipment Location Status: INACTIVE

Inspection Interval In Years: 10

Available During Run: No

Int Entry Poss: Yes

Year Built:

Description: S/D in REBOILER column of STRAWER

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

5

Task: Internal Visual Monitoring

Next Insp DT: 1/1/2008

Last Insp DT: 1/1/1998

Basis: Prev bndl life

Extent:

Inspection Comments:

Recommendation Number:

REC-17350

Equipment ID:

E-1117

Asset Type:

281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

6/30/2003

Completion:

Author:

JMJG

Headline:

S/D Recommendation

Notes:

Recommendations:

Open & inspect if unit is to be placed back i/s. Inspect for CUI during next external inspection (1/07). EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .



<b>Report Date: 10/2/2012</b>		<b>RICHMOND REFINERY</b>		<b>Data Source: Meridium</b>	
<b>Division: 2DD - DR DISTILLATION</b>		<b>Unit: 0955 - 4 CRUDE UNIT PLT 11</b>		<b>Asset Type: 281 - Shell and Tube Exchanger Location</b>	
<b>Equip ID: E-1127A</b>		<b>Asset Type: 281</b>		<b>State Reported: 46</b>	
<b>Equipment Location Status: INACTIVE</b>		<b>Inspection Interval In Years:</b>		<b>Name: Corrosion Under Insulation (CUI)</b>	
<b>Available During Run: No</b>		<b>In Entry Poss? Yes</b>		<b>1 Name: Sulfidation</b>	
<b>Description: 2 SC SHUT REBLR VBCR (OOS)</b>					

<b>CM Description:</b>		<b>Current Corrosion Rate</b>		<b>Remaining Life</b>		<b>Retirement Date</b>	
UT Monitoring		5					
<hr/>							
<b>Task:</b>	RBMI_Eddy Current IR		<b>Next Insp DT:</b> 8/8/2010		<b>Last Insp DT:</b> 8/8/2005		
<b>Basis:</b>	Recognized practice WITHOUT Criticality rating.		<b>Extent:</b> 40% of Tubes (Min. with Eddy Current -50 tubes; Min. with IRIS - 10 tubes) (R-214)				
<b>Inspection Comments:</b>							
<b>Task:</b>	Internal Visual Monitoring		<b>Next Insp DT:</b> 10/1/2001		<b>Last Insp DT:</b> 10/1/1995		
<b>Basis:</b>	Bundle life		<b>Extent:</b>				
<b>Inspection Comments:</b>							
<hr/>							
<b>Recommendation Number:</b>		REC-17354		<b>Equipment ID:</b>		E-1127A	
<b>Rec Type:</b>	SHUTDOWN	<b>Rec Status:</b>	Approved	<b>Created:</b>	7/1/2003	<b>Completion:</b>	
<b>Headline:</b>	S/D Recommendation						
<b>Notes:</b>	Recommendations: Unit is o/s; an internal inspection will be required prior to placing it back in service. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .						
<hr/>							

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equipment ID: E-1127B	Asset Type: 281	State Reported:	Strategy Nbr:	46 Name: Corrosion Under Insulation (CUI)
Equipment Location Status: INACTIVE	Inspection Interval In Years: 6			U Name: Sulfidation
Available During Run: No	Unit Entry Poss?: Yes	Year Built:		
Description: 2 SC STRIP REBLR/ VECR (OOS)				

## CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

5

Task: Internal Visual Monitoring Next Insp DT: 10/1/2001 Last Insp DT: 10/1/1995

Basis: Bundle life Extent:

## Inspection Comments:

Task: RBMI\_Eddy Current IR Next Insp DT: 8/8/2010 Last Insp DT: 8/8/2005

Basis: Recognized practice WITHOUT Criticality rating. Extent: 40% of Tubes (Min. with Eddy Current -50 tubes; Min. with IRIS - 10 tubes) (R-214)

## Inspection Comments:

## Recommendation Number:

REC-17355

## Equipment ID:

E-1127B

Asset Type: 281

## Rec Type:

SHUTDOWN

## Rec Status:

Approved

## Created:

7/1/2003

## Completion:

## Author:

JM/G

## Headline:

S/D Recommendation

## Notes:

Recommendations:

Unit is o/s; an internal inspection will be required prior to placing it back in service. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1161	Asset Type: 281	State Reported:	State: Nbr	45 Name: Amine Corrosion
Equipment Location Status: ACTIVE	Inspection Interval: In Years			46 Name: Ammonium Bisulfide Corrosion
Available During Run: No	Int Entry Poss: Yes	Year Built:		47 Name: Sour Water Corrosion (acidic)
Description: C-1160 INTERCONDENSER RD DK VAC STRUCTURE				48 Name: HCl Corrosion
				49 Name: Corrosion Under Insulation (CUI)
				50 Name: Cooling Water Corrosion

CM Description:	Current Corrosion Rate	Remaining Life	Retirement Date
UT Monitoring	2	186.544	8/24/2193
Task: Eddy Current IRIS	Next Insp DT: 2/15/2012	Last Insp DT: 2/15/2007	
Basis: API-510; IS-57	Extent: 25% of tubes		
Inspection Comments:	Use IRIS to prove out and to look for cracking/hydrating damage. Extreme caution must be used to prevent damage to bundle during handling and cleaning since most failures occur during these activities. -jmg 12/23/08		
Task: Visual CUI Monitoring	Next Insp DT: 2/13/2012	Last Insp DT: 2/13/2007	
Basis: API-510, IS-46	Extent: 50% of suspect areas		
Inspection Comments:			

Recommendation Number: REC-17365 Equipment ID: E-1161 Asset Type: 281  
 Rec Type: SHUTDOWN Rec Status: Approved Created: 7/29/2003 Completion: Author: JMJC  
 Headline: S/D Recommendation  
 Notes: Recommendations:  
 Open & inspect, anticipate repairs/replacement of channel. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

Recommendation Number: REC-96640 Equipment ID: E-1161 Asset Type: 281  
 Rec Type: Rec Status: Approved Created: 1/25/2012 8:00:40 AM Completion: Author: TBEA  
 Headline: damaged insulation CUI inspection  
 Notes: Recommendations:  
 INFORMATION External inspection of the insulation on E-1161 and E-1162 exchanger shells revealed damaged insulation and potential CUI on the shell. Additional insulation needs to be removed to facilitate the external inspection. Maximo 349853 REC-96640(E-1161) Maximo 349854 (E-1162) RECOMMENDATIONS 1. Remove a 3 inch band of insulation on the south end of both exchangers to expose the bare steel. Remove additional pending inspection recommendation. 2. Contact FER inspection to externally inspect the shell. 3. Additional scale removal may be required with a flapper wheel following insulation removal pending inspection recommendation. 4. Evaluate results 5. Repair as needed, clean coat and re-insulate following inspection recommendation. Contact John Beauregard 2-5187 with questions or concerns. \*\*Material, Fabrication, Welding, Inspection and Testing shall be performed in accordance with the Richmond Refinery - Metals Craft, Quality Assurance Procedures. .

Recommendation Number: REC-96641 Equipment ID: E-1161 Asset Type: 281  
 Rec Type: Rec Status: Approved Created: 1/25/2012 8:02:29 AM Completion: Author: TBEA  
 Headline: damaged insulation CUI inspection  
 Notes: Recommendations:  
 INFORMATION External inspection of the insulation on E-1161 and E-1162 exchanger shells revealed damaged insulation and potential CUI on the shell. Additional insulation needs to be removed to facilitate the external inspection. Maximo 349853 REC-96640(E-1161) Maximo 349854 (E-1162) RECOMMENDATIONS 1. Remove a 3 inch band of insulation on the south end of both exchangers to expose the bare steel. Remove additional pending inspection recommendation. 2. Contact FER inspection to externally inspect the shell. 3. Additional scale removal may be required with a flapper wheel following insulation removal pending inspection recommendation. 4. Evaluate results 5. Repair as needed, clean coat and re-insulate following inspection recommendation. Contact John Beauregard 2-5187 with questions or concerns. \*\*Material, Fabrication, Welding, Inspection and Testing shall be performed in accordance with the Richmond Refinery - Metals Craft, Quality Assurance Procedures. .

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1162

Asset Type: 281

State Reported:

Strategy Nbr:

45 Name: Amine Corrosion

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

3 Name: Sour Water Corrosion (acidic)

Available During Run: No

Int. Entry Poss: Yes

Year Built:

9 Name: HCl Corrosion

Description: C-1160 INTERCONDENSER AND DR. VAC STRUCTURE

6 Name: Corrosion Under Insulation (CUI)

49 Name: Cooling Water Corrosion

## CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

2

85

1/24/2092

Task: Visual CUI Monitoring

Next Insp DT: 2/14/2012

Last Insp DT: 2/14/2007

Basis: API-510, IS-46

Extent: 25% of suspect areas

Inspection Comments:

Task: Eddy Current IRIS

Next Insp DT: 2/17/2012

Last Insp DT: 2/17/2007

Basis: API-510, IS-57

Extent: 25% of tubes

Inspection Comments:

Use IRIS to prove out and to look for cracking/hydriding damage. Extreme caution must be used to prevent damage to bundle during handling and cleaning since most failures occur during these activities. -jmg 12/23/08

## Recommendation Number:

REC-17366

Equipment ID:

E-1162

Asset Type:

281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

11/1/1996

Completion:

Author:

JMJG

Headline:

S/D Recommendation

Notes:

Recommendations:

Open & inspect prior to 10/05 for 10-year inspection. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

## Recommendation Number:

REC-96642

Equipment ID:

E-1162

Asset Type:

281

Rec Type:

Rec Status:

Approved

Created:

1/25/2012 8:04:34 AM

Completion:

Author:

TBEA

Headline:

Damaged insulation\_CUI inspection

Notes:

Recommendations:

INFORMATION External inspection of the insulation on E-1161 and E-1162 exchanger shells revealed damaged insulation and potential CUI on the shell. Additional insulation needs to be removed to facilitate the external inspection. Maximo 349853 REC-96640(E-1161) Maximo 349854 (E-1162) RECOMMENDATIONS 1. Remove a 3 inch band of insulation on the south end of both exchangers to expose the bare steel. Remove additional pending inspection recommendation. 2. Contact FER inspection to externally inspect the shell. 3. Additional scale removal may be required with a flapper wheel following insulation removal pending inspection recommendation. 4. Evaluate results 5. Repair as needed, clean coat and re-insulate following inspection recommendation. Contact John Beauregard 2-5187 with questions or concerns. \*\*Material, Fabrication, Welding, Inspection and Testing shall be performed in accordance with the Richmond Refinery - Metals Craft, Quality Assurance Procedures. .

## Recommendation Number:

REC-96643

Equipment ID:

E-1162

Asset Type:

281

Rec Type:

Rec Status:

Approved

Created:

1/25/2012 8:05:33 AM

Completion:

Author:

TBEA

Headline:

damaged insulation\_CUI inspection

Notes:

Recommendations:

INFORMATION External inspection of the insulation on E-1161 and E-1162 exchanger shells revealed damaged insulation and potential CUI on the shell. Additional insulation needs to be removed to facilitate the external inspection. Maximo 349853 REC-96640(E-1161) Maximo 349854 (E-1162) RECOMMENDATIONS 1. Remove a 3 inch band of insulation on the south end of both exchangers to expose the bare steel. Remove additional pending inspection recommendation. 2. Contact FER inspection to externally inspect the shell. 3. Additional scale removal may be required with a flapper wheel following insulation removal pending inspection recommendation. 4. Evaluate results 5. Repair as needed, clean coat and re-insulate following inspection recommendation. Contact John Beauregard 2-5187 with questions or concerns. \*\*Material, Fabrication, Welding, Inspection and Testing shall be performed in accordance with the Richmond Refinery - Metals Craft, Quality Assurance Procedures. .

Equip ID: E-1163A

Asset Type: 281

State Reported:

Strategy Nbr:

80 Name: Polysulfide/Water Corrosion

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

3 Name: Sour Water Corrosion (acidic)

Available During Run: No

Int. Entry Poss: Yes

Year Built:

42 Name: CO2 Corrosion

9 Name: HCl Corrosion

46 Name: Corrosion Under Insulation (CUI)

11 Name: Sulfidation

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Description: CRUDE/C-1160 BTMS AT/DK ABOVE E-1165S  
89 Name Under Deposit Corrosion

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

4.25

66.118

12/17/2077

Task: Visual CUI Monitoring

Next Insp DT: 2/21/2012

Last Insp DT: 2/21/2007

Basis: API-510, IS-46

Extent: 50% of suspect areas

Inspection Comments:

No documented inspection for CUI exists; used last external inspection date for baseline and gave a 1-year default frequency. Shell side process temperatures are ~260 deg F; tube side are ~400 deg F. -jmg 12/23/08

Recommendation Number:

REC-17367

Equipment ID:

E-1163A

Asset Type:

281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

7/29/2003

Completion:

Author:

JMJG

Headline:

S/D Recommendation

Notes:

Recommendations:

Open & inspect, 10% ET to verify bundle corrosion rates. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1163B

Asset Type: 281

State Reported:

Safety Nbr:

9 Name: HCL Corrosion

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

46 Name: Corrosion Under Insulation (CUI)

Available During Run: No

Int Entry Poss: Yes

Year Built:

1 Name: Sulfidation

Description: CRUDE/ C-1120 ETMS AT DK ABOVE ETMS

2 Name: High Temp H<sub>2</sub>S Corrosion

39 Name: Under Deposit Corrosion

## CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

4.25

25.882

9/22/2037

Task: Eddy Current IRIS

Next Insp DT: 2/21/2012

Last Insp DT: 2/21/2007

Basis: API-510, IS-1

Extent: 50% of tubes

Inspection Comments: RFEC results indicate bundle has 8 years to 1/2-wall, tube 4 on row 11 had 27% wall loss which gives a 1/2-wall date of 5/2015; inspect on or before this date. -jmg 12/23/08

Task: Visual CUI Monitoring

Next Insp DT: 2/21/2012

Last Insp DT: 2/21/2007

Basis: API-510, SI-46

Extent: 50% of suspect locations

Inspection Comments: No documented inspection for CUI exists; used last external inspection date for baseline and gave a 1-year default frequency. Tube side process temperatures are ~260 deg F; shell side are ~400 deg F. -jmg 12/23/08

## Recommendation Number:

REC-17368

Equipment ID:

E-1163B

Asset Type:

281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

11/1/1996

Completion:

Author:

JMIG

Headline:

S/D Recommendation

Notes:

Recommendations:

Open &amp; inspect, 10% ET to confirm corrosion rates. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1181

Asset Type: 281

State Reported:

Strategy No:

13 Name: Sour Water Corrosion (acidic)

Equipment Location Status: INACTIVE

Inspection Interval In Years: 10

26 Name: Corrosion Under Insulation (CUI)

Available During Run: No

Int Entry Poss: Yes

Year Built:

Description: HIGH NAPIHA, CW (OOS) ABOVE 4-1115

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

5

Task: Internal Visual Monitoring

Next Insp DT: 5/1/1996

Last Insp DT: 5/1/1986

Basis: API 510

Extent:

Inspection Comments:

Task: External Visual Monitoring

Next Insp DT: 8/1/1996

Last Insp DT: 8/1/1991

Basis: API 510

Extent:

Inspection Comments:

Task: RBMI\_Eddy Current IR

Next Insp DT: 8/8/2010

Last Insp DT: 8/8/2005

Basis: Recognized practice  
WITHOUT Criticality rating.

Extent: 40% of Tubes (Min. with Eddy Current -50 tubes; Min. with IRIS - 10 tubes) (R-214)

Inspection Comments:

Recommendation Number:

REC-17387

Equipment ID:

E-1181

Asset Type:

281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

11/1/1996

Completion:

Author:

MJMG

Headline:

S/D Recommendation

Notes:

Recommendations:

Report Date:10/2/2012

## RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1197A	Asset Type: 281	State Reported:	State Nbr:	45 Name: Amine Corrosion
Equipment Location Status: ACTIVE	Inspection Interval in Years:			46 Name: Sour Water Corrosion (acid)
Available During Run: No	Int. Entry/Pass: Yes	Year Built:		49 Name: CO2 Corrosion
Description: C-1000 STABILIZER REBOILER				50 Name: Oxygen Pitting
				55 Name: Corrosion Under Insulation (CUI)

## CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

4.781

37.231

5/4/2044

Task: Eddy Current IRIS

Next Insp DT: 3/31/2012

Last Insp DT: 3/31/2007

Basis: API-510, IS-1 &amp; -9

Extent: 25% of tubes

Inspection Comments: Use the results of the last ET inspection as a guide for determining which areas of the bundle to inspect. -jmg 3/4/09

## Recommendation Number:

REC-17393

Equipment ID:

E-1197A

Asset Type:

281

Rec Type: SHUTDOWN

Rec Status: Approved

Created: 8/11/2003

Completion:

Author: JMIG

Headline: S/D Recommendation

Notes:

Recommendations:

Open &amp; inspect for continued corrosion on floating head and new bundle. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .



Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 281 - Shell and Tube Exchanger Location

Equip ID: E-1197B

Asset Type: 281

State Reported

Strategy Nbr

45 Name Amine Corrosion

Equipment Location Status: ACTIVE

Inspection Interval In Years: 6

46 Name Sour Water Corrosion (active)

Available During Run: No

Int Entry Ross? Yes

Year Built

42 Name CO2 Corrosion

48 Name Oxygen Pitting

Description: C-1000 ST AND PLATE REBOILER

44 Name Corrosion Under Insulation (CUI)

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

6.374

33.103

3/18/2040

Task: Eddy Current IRIS

Next Insp DT: 3/31/2012

Last Insp DT: 3/31/2007

Basis: API-510; IS-1 &amp; -9

Extent: at least 25% of tubes

Inspection Comments:

Use the results of the last ET inspection as a guide for determining which areas of the bundle to inspect. -jmg 3/4/09

Recommendation Number:

REC-17394

Equipment ID:

E-1197B

Asset Type:

281

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

8/11/2003

Completion:

Author:

JMJC

Headline:

S/D Recommendation

Notes:

Recommendations:

Open &amp; inspect for CO2 attack/corrosion insp in 6 years (floating head is experiencing attack). EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

# Inspection Plan With Recommendations



Report Date: 10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 282 - Air Cooled Exchanger Location

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 282 - Air Cooled Exchanger Location

Equip ID: E-1129 (955)

Asset Type: 282

Status Reported

Status Value

13 Name: Soil Water Corrosion (acid)

Equipment Location Status: AGHM

Inspection Interval in Years: 10

40 Name: Hydrogen Stress Cracking in H<sub>2</sub>

Available During Run: YG

Inc. Entry Pass No

Year Built

45 Name: Corrosion Under Insulation (CUI)

Description: 2 SHEET COOLER BEAN

47 Name: Atmospheric Corrosion

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

3.541

43.773

8/14/2055

Task: Eddy Current IRIS

Next Insp DT: 3/1/2012

Last Insp DT: 3/1/2002

Basis: API-510, IS-13

Extent: 25% of tubes

Inspection Comments: A/I to adjust extent of inspection based on plant conditions and actual corrosion rates. -jmg 3/10/09

Recommendation Number:

REC-17359

Equipment ID:

E-1129 (955)

Asset Type:

282

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

7/1/2003

Completion:

Author:

JMIG

Headline:

S/D Recommendation

Notes:

Recommendations:

Open & inspect, ET 10% of tubes. Inspect behind tubesheet for external corrosion. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 282 - Air Cooled Exchanger Location

Equip ID: E-1168A

Asset Type: 282

State Reported:

Strategy Nbr:

13 Name: Sour Water Corrosion (acidic)

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

47 Name: Atmospheric Corrosion

Available During Run: No

Int Entry Pass? No

Year Built:

Description: VTCR REFLUX COOLER FFAN

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

4.398

45.02

2/13/2052

Task: Addl Surv Actv 1

Next Insp DT: 3/31/2012

Last Insp DT: 3/31/2007

Basis: API-510, IS-47

Extent: 100%

Inspection Comments:

Externally inspect tube ends at the tube sheet interface for atmospheric corrosion; will require shroud removal and possible staging at both header boxes. -jmg 3/12/09

Recommendation Number:

REC-17377

Equipment ID:

E-1168A

Asset Type:

282

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

7/31/2003

Completion:

Author:

JMJG

Headline:

S/D Recommendation

Notes:

Recommendations:

Pull 50 random plugs from each box for ET & visual inspection. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 282 - Air Cooled Exchanger Location

Equip ID: E-1168B

Asset Type: 282

State Reported:

Strategy Nbr

43 Name: Sour Water Corrosion (acidic)

Equipment Location Status: ACTIVE

Inspection Interval In Years: 5

47 Name: Atmospheric Corrosion

Available During Run: No

Int. Entry Ross? No

Year Built:

Description: WIND REFRIG COOLER HEAD

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

2.546

77.769

11/13/2084

Task: Addl Surv Actv 1

Next Insp DT: 3/31/2012

Last Insp DT: 3/31/2007

Basis: API-510, IS-47

Extent: 100%

Inspection Comments:

Externally inspect tube ends at the tube sheet interface for atmospheric corrosion; will require shroud removal and possible staging at both header boxes. -jmg 3/12/09

Recommendation Number:

REC-17378

Equipment ID:

E-1168B

Asset Type:

282

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

7/31/2003

Completion:

Author:

JMJG

Headline:

S/D Recommendation

Notes:

Recommendations:

Pull 50 random plugs from each box for ET & visual inspection. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .

<b>Report Date: 10/2/2012</b>	<b>RICHMOND REFINERY</b>	<b>Data Source: Meridium</b>
<b>Division: 2DD - DR DISTILLATION</b>	<b>Unit: 0955 - 4 CRUDE UNIT PLT 11</b>	<b>Asset Type: 282 - Air Cooled Exchanger Location</b>

<b>Equipment ID: E-1175</b>	<b>Asset Type: 282</b>	<b>State Reported:</b>	<b>Strategy No:</b>	<b>18 Name: Sour Water Corrosion (acidic)</b>
<b>Equipment Location Status: ACTIVE</b>	<b>Inspection Interval In Years: 5</b>	<b>Int Entry Ross? No</b>	<b>Year: 11/11</b>	<b>47 Name: Atmospheric Corrosion</b>
<b>Available During Run: No</b>				
<b>Description: DECASR COOLR SHARED PLAN W/ E-1175</b>				

<b>CM Description:</b>	<b>Current Corrosion Rate</b>	<b>Remaining Life</b>	<b>Retirement Date</b>
UT Monitoring	1.714	105.018	7/1/2112

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<b>Task:</b>	Eddy Current IRIS	<b>Next Insp DT:</b>	9/13/2012	<b>Last Insp DT:</b>	9/13/2007
<b>Basis:</b>	API-510, IS-13	<b>Extent:</b>	25% of tubes		
<b>Inspection Comments:</b>					

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<b>Recommendation Number:</b>	REC-17385	<b>Equipment ID:</b>	E-1175	<b>Asset Type:</b>	282
<b>Rec Type:</b>	SHUTDOWN	<b>Rec Status:</b>	Approved	<b>Created:</b>	8/6/2003
<b>Headline:</b>	S/D Recommendation	<b>Completion:</b>		<b>Author:</b>	JMIG
<b>Notes:</b>	Recommendations:				

<b>Recommendation Number:</b>	REC-58196	<b>Equipment ID:</b>	E-1175	<b>Asset Type:</b>	282
<b>Rec Type:</b>	INSPECTION	<b>Rec Status:</b>	Closed	<b>Created:</b>	12/13/2006 6:32:38 AM
<b>Headline:</b>	E-1175 Internal Inspection Due 6-24-07				
<b>Notes:</b>	Recommendations: Need to make E-1175 available for internal inspection by 6/24/07. Operations has indicated this equipment is available on the run. RECOMMENDATION: 1)Stage for access 2) Pull 10% of header plugs & hydroblast 3)ET opened/cleaned tubes 4)UT gage and visually inspect header box 5)Remove shroud behind header box for visual inspection of tubesheet and tube ODs Any required repairs will be on a separate recommendation. Contact Joe George @ 2-3389 when ready for inspection or for more information.				

# Inspection Plan With Recommendations



Report Date: 10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 291 - Box Furnace Location

Report Date: 10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 291 - Box Furnace Location

Equip ID: F-1100A

Asset Type: 291

State Reported:

Strategy Nbr

3 Name: Creep/Stress Rupture

Equipment Location Status: ACTIVE

Inspection Interval in Years: 12

11 Name: Oxidation

Available During Run:

Int Entry Poss?

Year Built:

14 Name: Refractory Degradation

Description: ATMOSPHERIC FURNACE

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

25.587

6.253

2/4/2018

Task: Infrared Monitoring

Next Insp DT: 2/22/2012

Last Insp DT: 2/22/2011

Basis:

Extent:

Inspection Comments:

Recommendation Number:

REC-17395

Equipment ID:

F-1100A

Asset Type: 291

Rec Type: SHUTDOWN

Rec Status:

Approved

Created:

8/18/2003

Completion:

Author: JM/G

Headline: S/D Recommendation

Notes:

Recommendations:

Open & inspect. Stage/gage tubes, inspect roof hangers for deterioration. EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997.



Report Date: 10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 291 - Box Furnace Location

Equipment ID: F-1100B

Asset Type: 291

Status: Reported

Stage: Nbr

Name: Creep/Stress Rupture

Equipment Location: Status: ACTIVE

Inspection Interval: In Years: 12

Name: Oxidation

Available During Run

Int. Entry Poss?

Year Built

Description: ATMOSPHERIC FURNACE

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

16.418

9.053

11/23/2020

Task: Infrared Monitoring

Next Insp DT: 2/22/2012

Last Insp DT: 2/22/2011

Basis:

Extent:

Inspection Comments:

Recommendation Number:

REC-17396

Equipment ID:

F-1100B

Asset Type: 291

Rec Type:

SHUTDOWN

Rec Status:

Closed

Created:

8/18/2003

Completion:

Author: JMIG

Headline:

S/D Recommendation

Notes:

Recommendations:

Open & inspect. Stage/gage tubes & return bends, inspect roof hangers for deterioration. Anticipate replacement of west end return ells 7-23/7-24 & 7-25/7-26 (data indicates t-min to be reached 2/06). EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997.

Report Date:10/2/2012

RICHMOND REFINERY

Data Source: Meridium

Division: 2DD - DR DISTILLATION

Unit: 0955 - 4 CRUDE UNIT PLT 11

Asset Type: 291 - Box Furnace Location

Equip ID: F-1160

Asset Type: 291

State Reported:

Strategy Nbr:

1 Name: Sulfidation

Equipment Location Status: ACTIVE

Inspection Interval In Years: 12

2 Name: Creep / Stress Rupture

Available During Run:

Int. Entry Boss?

Year Built:

3 Name: Oxidation

Description: VACUUM FURNACE

CM Description:

Current Corrosion Rate

Remaining Life

Retirement Date

UT Monitoring

64.938

5.141

12/13/2016

Task: Infrared Monitoring

Next Insp DT: 3/1/2012

Last Insp DT: 3/1/2011

Basis:

Extent:

Inspection Comments:

Recommendation Number:

REC-17397

Equipment ID:

F-1160

Asset Type:

291

Rec Type:

SHUTDOWN

Rec Status:

Approved

Created:

8/18/2003

Completion:

Author:

JMJG

Headline:

S/D Recommendation

Notes:

Recommendations:

Open & inspect, replace two heavily oxidized convection tubes (1-10 & 8-164). EXPERT REVIEWER = EHNicolls EXPERT REVIEW DATE = 1/1/1997 .